

LISTING OF CLAIMS

1. (Original) A method for manufacturing engine fuel, comprising:  
a pretreatment step for filtering a higher-boiling-point vegetable oil/fat;  
5 a first treatment step for introducing ozone, a reducing agent and a polymerization inhibitor into the higher-boiling-point oil/fat, so as to cause the higher-boiling-point oil/fat component and the ozone to react with each other while adjusting the reactivity in the presence of the reducing agent and polymerization inhibitor, to thereby crack the higher-boiling-point oil/fat component;

10 a first filtering step for filtering the higher-boiling-point oil/fat so as to remove therefrom solid components including the reducing agent and polymerization inhibitor having been deteriorated by the cracking reaction;

15 a second treatment step for newly introducing a fresh reducing agent and a fresh polymerization inhibitor both having higher activities and for simultaneously introducing ozone, into the filtrate, so as to crack the higher-boiling-point oil/fat component while subsequently stirring the higher-boiling-point oil/fat component; and

20 a step for repeating said treatment steps for cracking the higher-boiling-point oil/fat component in a manner to conduct such a treatment step totally two or more times while interposing said filtering step between said treatment steps, to thereby reform the higher-boiling-point oil/fat into a lower-boiling-point oil while delivering an antifreezing agent into the lower-boiling-point oil.

2. (Original) A method for manufacturing engine fuel of claim 1,

25 wherein said stirring treatments for breaking the constitution of the starting material to thereby cause a cracking phenomenon substantially require a stirring rotational speed of at least 10,000 rpm.

3. (Currently Amended) A method for manufacturing engine fuel of ~~any one of claims 1 and 2~~ claim 1,

30 wherein the vegetable oil is a filtrate obtained by compressing waste vegetables.

4. (Currently Amended)A method for manufacturing engine fuel of ~~any one of claims~~  
~~1 through 3 claim 1,~~

wherein said step for filtering out the solid components comprises a step for introducing  
and using a filtering medium including at least one of activated clay, diatomaceous earth,  
5 zeolite, activated carbon, and bone ash, at a rate of 20 kg to 25 kg to 1 kiloliter of the reaction  
liquid.

5. (Currently Amended)A method for manufacturing engine fuel of ~~any one of claims~~  
~~1 through 4 claim 1,~~

10 wherein said treatment step comprises a step for introducing ozone in a form of  
ozone-containing air into the cracking reaction, at a concentration of 500 ppm to 30,000 ppm.

6. (Currently Amended)A method for manufacturing engine fuel of ~~any one of claims~~  
~~1 through 5 claim 1;~~

15 wherein the reducing agent includes at least one of ferric oxide compound and copper  
compound, and is used at a rate of 0.15 g for 1 kiloliter of reaction liquid.

7. (Currently Amended)A method for manufacturing engine fuel of ~~any one of claims~~  
~~1 through 6 claim 1,~~

20 wherein the polymerization inhibitor includes a phosphorus compound and is used at a  
rate of 0.2 g to 0.25 g for 1 kiloliter of reaction liquid.

8. (Currently Amended)A method for manufacturing engine fuel of ~~any one of claims~~  
~~1 through 7 claim 1,~~

25 wherein the antifreezing agent includes castor oil and is introduced into the  
lower-boiling-point oil at a concentration of 0.05 wt.% to 0.1 wt.%.

9. (Original) An apparatus for manufacturing engine fuel by cracking a higher-boiling-point vegetable oil/fat to thereby reform the same into a lower-boiling-point oil, comprising:

5        a reaction drum into which the higher-boiling-point oil/fat is introduced; and stirring means within said reaction drum;

      wherein said stirring means comprises: a rotating propeller plate for revolving a reaction liquid; and a baffle provided at an inner periphery of said reaction drum;

10      wherein said baffle comprises a vertical plate having a widthwise portion protruded from an inner peripheral wall surface of said reaction drum toward the center of said reaction drum, and said baffle is formed with saw-toothed cutouts at the protruded end; and

      wherein said reaction drum is provided with a delivering port for delivering a reducing agent and a polymerization inhibitor into said reaction drum.

15      10. (Original) An apparatus for manufacturing engine fuel of claim 9,

      wherein said rotating propeller plate comprises a propeller having a peripheral portion formed with saw-toothed cutouts.

11. (Original) An apparatus for manufacturing engine fuel by cracking a  
20      higher-boiling-point vegetable oil/fat to thereby reform the same into a lower-boiling-point oil, comprising:

      a reaction drum into which the higher-boiling-point oil/fat is introduced;

      stirring means within said reaction drum;

25      an ozone gas introducing pipe having a spout for introducing ozone for causing a cracking reaction; and

      suspending means provided near said spout of said ozone gas introducing pipe, for suspending the ozone gas;

      wherein said suspending means is formed of a horizontal rotary-rod wound with wires in a resilient manner; and

wherein said reaction drum is provided with a delivering port for delivering a reducing agent and a polymerization inhibitor into said reaction drum.

12. (Original) A plant for manufacturing engine fuel, comprising:

5           a starting-material tank for storing oil/fat therein;

          a filtering device for filtering out solid components of the oil/fat in said starting-material tank;

10           a first reaction vessel for conducting first cracking by reacting ozone with the oil/fat filtered by said filtering device;

          an oil/water separation device for separating that water content involved in the cracking reaction, from the oil/fat;

15           a filtering medium charging vessel for delivering a filtering medium into the oil/fat phase from which the water phase component has been excluded by said oil/water separation device;

          a first filtering device for conducting first filtering of the oil/fat into which the filtering medium has been delivered;

          a second reaction vessel for reacting ozone with the filtered oil/fat, to thereby conduct second cracking;

20           a second filtering device for conducting second filtering of the oil/fat subjected to the second cracking;

          an adding device for adding an additive into the oil/fat subjected to the second filtering; and

25           an impurity adsorbing vessel and a filtering vessel for cooperatively purifying the water phase component from which the oil/fat phase has been excluded by said oil/water separation device;

          wherein each of said first reaction vessel and said second reaction vessel is provided with a delivering port for delivering a reducing agent and a polymerization inhibitor into said reaction vessel.